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# Knowledge and practices of private healthcare providers regarding tuberculosis case notification in Rural Maharashtra

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**ABSTRACT**

India carries the highest share of active and missing tuberculosis (TB) cases globally. The Government of India is prioritizing private sector engagement (PSE) in TB elimination activities, as most healthcare-seeking in the country happens in this sector. This study aimed to understand the knowledge and practices of private healthcare providers (PHP) on various aspects of TB case notification through the National TB Elimination Programme (NTEP). This cross-sectional study was carried out between Oct 2020 to April 2021 amongst PHPs in the Junnar Tuberculosis Unit (TU), Pune District, Maharashtra. Junnar Block has 299 PHPs who assess, diagnose, and/or treat TB cases. A total of 97 participants were enrolled in the study. About 89 (91.8%) PHPs are aware that TB case notifications are mandatory by law. However, 80.4% are unaware of the Ni-kshay portal (web-based case surveillance system) by NTEP. Similarly, 74 (76.3%) must be aware of incentives for PHPs to collaborate with the government healthcare delivery system. 82.8% of total Ayurveda, Unani, Naturopathy, Siddha, and Homeopathy (AYUSH) practitioners and 46.2% of Allopathic practitioners have poor knowledge about TB case notification, with a Chi-square value of 14.36 ($p<0.01$). Our study shows that the active engagement of private providers (PPs), especially AYUSH practitioners in rural areas, is a need of the hour in achieving TB elimination.



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## 1. INTRODUCTION

Tuberculosis (TB) is an infectious disease that poses a major global health problem. The incidence and prevalence are high in low and middle-income countries [1]. An estimated 10.6 million people were infected with TB globally in 2021, with 1.6 million deaths, including 187,000 people with human immunodeficiency virus (HIV). The global data shows that in 2021, TB is the second leading infectious disease with high mortality after COVID-19 [2]. Worldwide, TB incidence is falling at about 2% per year, with a cumulative reduction of 11% between 2015 and 2020. This is halfway to the End TB strategy milestone of a 20% reduction between 2015 and 2020 [3]. Multidrug-resistant TB (MDR-TB) remains a public health crisis and a health security threat [4].

In 2014, the world health assembly ratified the 'End TB strategy' to terminate the global epidemic of TB by the year 2035 [5]. The vital components of this strategy include: i) service integration, which is necessary

for improved management of TB and patient-centered high-quality TB care of international standards, is accessible and affordable to all who need it; and ii) the prevention aspect focuses on the early detection and treatment of all patients with TB. The End TB strategy targets a reduction in TB deaths by 95% and a reduction in new cases by 90% (as compared to 2015 levels) by 2035 [6].

Eight countries account for two-thirds of the total TB burden. India contributes 27% of the global TB burden, followed by China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa [7]. The estimated incidence of all forms of TB in India for 2020 was 188 per 100,000 population (129-257 per 100,000 population) [2]. Despite such a high incidence rate in India, there needs to be more documentation available on notification policies and challenges with their implementation [8].

India's national TB control program was started in 1962 and revised in 1993 as the revised national tuberculosis control program (RNTCP). The full-fledged program began in 1997 with the directly observed treatment short course (DOTs) [9]. Subsequently, the government acknowledged the importance of TB notification and sustained surveillance in hastening proper TB treatment and preventing the spread of illness. TB was declared a notifiable disease, and RNTCP implemented a novel web-based application called 'Ni-kshay' to facilitate case-based TB notification in 2012 [10]. TB case notification was mandated by a gazette in 2018 [11]. The national strategic plan (NSP) for TB elimination 2017-2025 was released by the central TB division (CTD) of the ministry of health and family welfare in the year 2017, which laid down the strategic direction for the country to achieve the End of TB targets and sustainable development goals (SDGs) and to eliminate TB in India by the year 2025, five years ahead of the SDG target [12]. Built on build, prevent, text, and treat pillars, the NSP envisaged a TB-free India with zero deaths, diseases, and, poverty due to tuberculosis. In 2020, RNTCP was re-named as national TB elimination programme (NTEP), and NSP was revised as NSP to End TB in India 2020-2025 [13]. A particular focus emerged on private sector engagement (PSE), which was required to minimize the 'missing millions' or the large number of patients who fail to get notified to the health system.

Even though the renewed vigour in TB elimination activities through NTEP resulted in an increased number of patients seeking care in public facilities, almost 70% of the patients in the country still seek initial care in the private sector [14]. A meta-analysis by Goyal *et al.* [15] shows that the private sector uses anti-TB drugs with a non-standardized treatment regimen. Treatment adherence monitoring by private providers (PPs) is irregular or nil, leading to increased drop-outs and increased chances of developing drug-resistant TB cases. NTEP has adopted various strategies since the mid-1990s to effectively engage with the private healthcare sector, such as education, regulatory measures, provision of free services, partnership arrangements, and incentives over the years [16]. In the year 2018, numerous intensive efforts for PSE like incentives for private healthcare providers (PHP) for TB case notification, the launch of standard operating procedures on PSE in TB-HIV, and the launch of the joint effort for TB elimination (JEET) project, happened. Patient-provider support agencies (PPSAs) were contracted to facilitate the TB care cascade among patients diagnosed in the private sector and technical support units (TSUs) were established at the state level to provide programmatic technical support for the same [17]. As a result of these activities, the TB case notification from the private sector increased from 21% in 2017 to 28% of the target in 2019 [18]. However, enormous challenges remain, owing to the highly fragmented and diverse nature of the private healthcare sector, which also includes informal healthcare providers, especially in rural and tribal areas.

Maharashtra state contributed to 9% of the total TB cases notified in the country in 2019, with a notification rate of 183 per lakh population [18]. The private sector contributes to 12% of these reported cases. Pune district in the state has 7,890 providers who refer, diagnose, or treat tuberculosis patients. The proportion of TB cases notified by the private sector in the district in 2019 was 9% only. Low private sector notification was seen in the district's Velhe TB unit (TU), Daund TU, and Narayangaon TU [19]. There needs to be more published literature on lower TB case notification from the private healthcare sector in Maharashtra and the reasons for it, despite NTEP's well-written strategies and efforts to engage the private sector. The knowledge about rural and tribal areas, where the lion's share of PHPs practice alternative medicine systems like Ayurveda, Unani, Naturopathy, Siddha, and Homeopathy (AYUSH) or traditional medicine, is also very little. Junnar block in the Pune district is a tribal block comprising Narayangoan TU. We conducted this study among the PHPs of Narayangoan TU to understand their knowledge and practices on various aspects of TB case notification through NTEP, to plan for effective interventions.

## 2. METHOD

We conducted a cross-sectional, observational study from October 2020 to April 2021 in the Junnar block of Pune district in collaboration with the district TB centre (DTC), Pune (rural). The Institutional Research Ethics Committee of KEM Hospital Research Centre, Pune, approved the study protocol (the ethical clearance ID - PhD31). The Junnar block comprises 183 villages and one town [20]. Our study population included all private healthcare practitioners in Narayangoan TU with a qualification in one of the systems of medicine officially

recognized in India (Allopathy, Ayurveda, Unani, Naturopathy, Siddha, and Homeopathy) who provide healthcare services for a fee outside the public sector. We obtained lists of PHPs in the TU who either referred, diagnosed, or treated TB patients, from three sources- the DTC, junnar taluka medical practitioners association (JTMPA), and block-level government office of junnar block. After removing the duplicates, we had a final list of 299 providers. They belonged to the following categories: i) Physician–bachelor of medicine, bachelor of surgery (MBBS), and doctor of medicine (MD) in internal medicine; ii) Chest physician–MBBS and MD in pulmonology; iii) Paediatricians–Manage and/OR refer pediatric TB cases; iv) Orthopedicians-Manage and/OR refer TB cases; v) Obstetricians and Gynecologists–manage and/OR refer TB cases; vi) General practitioners-MBBS only; vii) AYUSH doctors (including Ayurveda, Unani, Siddha, and homeopathy systems of medicine).

In the Junnar block there were a total of 299 private providers assessing and/or diagnosing and/or treating TB cases. A purposive sample of 100 PHPs was decided to be included in the study, approximately 33% of the total 299 PHPs. The PHP was contacted over the phone for preliminary willingness to participate in the research and to schedule an appointment for the in-person interview. During the in-person visit by the researcher, after obtaining written informed consent, the PHPs were interviewed using a semi-structured questionnaire. The questionnaire focused on the following sections: demographic information, educational qualification, years of clinical experience, awareness about TB diagnosis and notification under NTEP, the preferred mode for TB notification, awareness of the Ni-kshay portal, and incentives for TB case notification.

The data from the study was entered and processed using statistical package for social sciences (SPSS for Windows, version 22.0, SPSS Inc., Chicago, Illinois, USA) and was presented in the form of frequencies, percentages, median, and interquartile ranges (IQR). The Chi-square test was used for categorical variables.

## 3. RESULTS

The study was conducted among PHPs in Narayangoan TU under the Pune (Rural) NTEP district. Private healthcare practitioners in this area are concentrated in clusters in three places, namely, Narayangoan, Junnar, and Alephata. Compiling the line lists of private healthcare practitioners in these areas received from the district TB centre, association of PHPs, and Panchayat office of Junnar block, we created a final listing of providers who either referred, diagnosed, or treated TB patients. The categorization of the PPs is in Table 1.

Table 1. Categories of PHPs in Narayangoan TU providing services toTB patients

| Category of PHP | Number (%) n=299 |
|---|---|
| AYUSH practitioner | 210 (70.2%) |
| General practitioners (MBBS) | 31 (12.36%) |
| Physician (MBBS MD)- General Medicine/Pulmonology | 20 (6.68%) |
| Obstetrician and Gynecologist | 14 (4.68%) |
| Pediatrician | 10 (3.34%) |
| Orthopedician | 9 (3.01%) |

We contacted 100 PHPs from this list to participate in the study (approximately 33% of PHPs), of which 3 were unwilling. Hence, we finally had 97 participants. The profile information about study participants includes the system of medicine, total clinical experience, information about types of patients catered to, and the type of healthcare facility is mentioned in Table 2.

The majority of PHPs follow the AYUSH system of medicine (59.8%), whereas the rest of them followed an allopathic system of medicine (40.2%). The 67% of theseproviders cater to patients with general illnesses, whilst 30.9% provide care for specific disease conditions, and 2.1% handle both types of patients. The 30.9% of these providers provided in-patient care as well.

The semi-structured questionnaire captured information about the knowledge and practices of participants regarding various aspects of TB case notification. While a good number of participants were aware of TB as a notifiable disease (94.8%) and that the PPs should mandatorily notify all TB cases to NTEP by law (91.8%). However, majority of them were unaware of the existence of Ni-kshay portal (80.4%), which is the web-based case surveillance system by NTEP for TB case notification, patient management, treatment records, contact tracing, and preventive therapy management. The 76.3% of the participants were also unaware of the incentivesgiven to PHPs at various stages of TB care by collaborating with thegovernment healthcare delivery system.

The 96.9% of the participants were not registered on Ni-kshay portal as a ‘health facility’ or ‘informant.’ 81.4% of the participants notified their TB cases to the nearest government health facility, and the majority of those (87.6%) preferred to do it by means of hardcopy referral. Details of the knowledge and practice of participants are provided in Table 3.

Table 2. Profile of participating PHPs (n=97)

| Characteristics | | Number (%) n= 97 |
|---|---|---|
| Gender | Male | 74 (76.3%) |
| | Female | 23 (23.7%) |
| Age | Median (with IQR) | 40 (40,49) |
| Age categories | <30 years | 2 (2.1%) |
| | 30-39 years | 43 (44.3%) |
| | 40-49 years | 32 (33.0%) |
| | ≥50 years | 20 (20.6%) |
| System of medicine | Allopathy | 39 (40.2%) |
| | AYUSH | 58 (59.8%) |
| Years of clinical experience | <5 years | 10 (10.) |
| | 5-15 years | 45 (46.4%) |
| | >15 years | 42 (43.3%) |
| Years of clinical experience | Median (with IQR) | 12 (5,15) |
| Category of private healthcare | AYUSH practitioner | 58 (59.8%) |
| | General practitioners (MBBS) | 9 (9.2 %) |
| Provider | Physician (MBBS MD)- General medicine/Pulmonology | 17 (17.5 %) |
| | Obstetrician and Gynecologist | 2 (2.0 %) |
| | Pediatrician | 10 (10.3 %) |
| | Orthopedician | 1 (1.0 %) |
| Types of patients catered | General illnesses | 65(67.0%) |
| | Illnesses specific to their specialty | 30 (30.9%) |
| | Both | 2 (2.1%) |
| Type of healthcare facility | Clinic (Only Out ptient Department (OPD) care) | 45 (46.4%) |
| | Hospital (Includes In- patient Department (IPD) care) | 30 (30.9%) |
| | Both | 22 (22.7%) |

Table 3. Knowledge and practices among the PHPs regarding variousaspects of TB case notification

| Questions | | Number (%) n=97 |
|---|---|---|
| Questions regarding knowledge | | |
| TB is a notifiable disease | Yes, I am aware | 92 (94.8%) |
| | No, I am not aware | 5 (5.2%) |
| TB notification is mandatory as per the Government order of the year 2012 | Yes, I am aware | 89 (91.8%) |
| | No, I am not aware | 8 (8.2%) |
| Ni-kshay web portal for TB case notification by NTEP | Yes, I am aware | 19 (19.6%) |
| | No, I am not aware | 78 (80.4%) |
| Incentives given by NTEP to private healthcare providers for TB case notification | Yes, I am aware | 23 (23.7%) |
| | No, I am not aware | 74 (76.3%) |
| Questions regarding practices | | |
| Are you registered as a PP in Ni-kshay portal? | Yes | 3 (3.1%) |
| | No | 94 (96.9%) |
| TB case notification to a government facility | Yes | 79 (81.4%) |
| | No | 18 (18.6%) |
| Mode of TB case notification to the government facility | Through Ni-kshay portal | 7 (7.2%) |
| | By hard copy referral | 85 (87.6%) |
| | Through government health worker | 5 (5.2%) |
| Preferred, convenient modality for TB case notification to the government facility | Through government health worker | 3 (3.1%) |
| | By email/website | 30 (30.9%) |
| | Mobile phone | 39 (40.2%) |
| | Hard copy | 25 (25.8%) |

We created a scoring system for categorizing the participants' knowledge, with arbitrary cut-off values. The awareness and knowledge about the TB notification system, the Ni-kshay web-based portal for TB case notification by NTEP were assessed using a scoring system. The scores allotted were as in Table 4.

The 68% of the participants have poor knowledge about various aspects of TB notification to NTEP, as per the cut-offs used. The association of knowledge scores with a system of medicine practiced was further analyzed which is mentioned in Table 5. The AYUSH practitioners have poor knowledge about various aspects of TB notification to NTEP, as per the cut-offs used.

Table 4. Scores allotted for knowledge questions administered to the participants and knowledge category

| Questions regarding knowledge | | Score |
|---|---|---|
| TB is a notifiable disease | Yes, I am aware | 1 |
| | No, I am not aware | 0 |
| TB notification is mandatory asper | Yes, I am aware | 1 |
| Government order of year 2012 | No, I am not aware | 0 |
| Ni-kshay web portal for TB case | Yes, I am aware | 1 |
| notification by NTEP | No, I am not aware | 0 |
| Incentives given by NTEP to PHPs | Yes, I am aware | 1 |
| for TB case notification | No, I am not aware | 0 |
| Maximum score | | 4 |
| Minimum score | | 0 |
| Poor knowledge | | 0-2 |
| Good knowledge | | 3-4 |
| Knowledge scores of participants (n=97) | | |
| Knowledge score | | Number of participants (Percentage) |
| Good knowledge (3-4) | | 31 (32%) |
| Poor knowledge (≤ 2) | | 66 (68%) |

Table 5. Association of knowledge scores with a system of medicine practiced

| | AYUSH practitioner (n=58) | Allopathic practitioner (n=39) |
|---|---|---|
| Poor knowledge | 48 (82.8%) | 18 (46.2%) |
| Good knowledge | 10 (17.2%) | 21 (53.8%) |

The 82.8% of total AYUSH practitioners have poor knowledge about TB case notification whereas 46.2% of allopathic practitioners have poor knowledge. The relationship between the system of medicine practiced and poor knowledge is significant, with a Chi-square value of 14.36 ($p<0.001$).We also analyzed the individual knowledge questions regarding TB notification to find out the association with the system of medicine practiced by PHPs using the Chi-square test, the results of which are provided in Table 6. The awareness regarding Ni-kshay portal and incentives to PHPs was lower among AYUSH practitioners

Table 6. Association of awareness regarding TB case notification with a system of medicinepracticed (n=97)

| | Allopathic practitioners (n=39) | AYUSH practitioners (n=58) | p-value |
|---|---|---|---|
| Ni-kshay web portal for TB case notification by NTEP | | | |
| Yes, I am aware | 16 (41%) | 3 (5.2%) | |
| No, I am notaware | 23 (59%) | 55 (94.8%) | <0.001 |
| Incentives are given by NTEP to PHPs for TB case notification | | | |
| Yes, I am aware | 14 (35.9%) | 9 (15.5%) | |
| No, I am not aware | 25 (64.1%) | 49 (84.5%) | 0.021 |

## 4. DISCUSSION

The Government of India declared TB as a notifiable disease in 2012, and a web-based application named Ni-kshay was introduced for case-based notification. The mandate was made legal by a gazette notification in the year 2018. Even after ten years of mandatory TB notification policy in India, this study on knowledge and practices regarding TB notification among the PHPs, reflects the ground reality. According to national family health survey NFHS-5, the private medical sector remains the primary source of healthcare for 52 % of households in urban areas and 46% in rural areas [21]. Our study shows that the majority of the PHPs (80.2%) in the Narayangaon TU practice AYUSH system of medicine. The 59.8% of the study participants were also AYUSH practitioners. This holds true in most of the country's rural areas, where people easily access them [22].

The knowledge regarding TB as a notifiable disease (94.8%) and that it is mandated by law (91.8%) was high and it is in line with the studies conducted in various other parts of the country, like Sahasrabudhe *et al.* [23] in Pimpri-Chinchwad Municipal Corporation, Maharashtra (97%) and Dey *et al.* [24] in Udupi, Karnataka (99%). However, the knowledge regarding the web-based case notification system Ni-kshay was poor (19.6%) and the knowledge regarding incentives to PHPs for notification (23.7%). A study among private practitioners in Kolkata, West Bengal, also revealed similar results [25]. Further questions regarding the practices show that only 3.1% of the participants were registered as 'healthcare facility' or 'informants' in Ni-kshay portal. This is much lower in comparison with other similar studies done in Kolkata and Udupi [24], [25]. It needs to show more effective engagement with private sector. Ni-kshay registration was nil among AYUSH providers, who are neither trained in nor formally involved in NTEP. There is also

growing concerned as AYUSH providers are not being registered in Ni-kshay, even though guidelines do not deter NTEP from doing the same, and this may contribute to the growing number of 'missing millions' in TB [14]. Of the 97 PHPs, 81.4 % reported TB cases to a government facility which is higher as compared to a study done in Trichy, South India 2021, where 72% referred TB cases to a government facility [26].

According to the mandatory TB notification gazette, PHPs will receive a nominal incentive of Indian Rupee (INR) 1,000 for each TB case notified. Of this, INR 500 will be granted upon notification or referral (after it has been validated) and INR 500 upon the end of the treatment [27]. However, the present study revealed that only 23.7% of participants were aware of this incentive. This knowledge needed to be improved among AYUSH providers. All these findings point towards gaps in the effective implementation of PSE activities of NTEP on the ground. The programme does not have a specific strategy to onboard the vast and diverse numbers of alternative medicine practitioners (AYUSH) and informal providers (like village practitioners, drug sellers, untrained allopathic providers, traditional healers, and faith healers) who are the first point of contact for numerous rural/tribal population and have an immense influence on the community. This leads to delays in diagnosis, the spread of disease in the community, and increased complications [14], [21], [28], [29], [30]. One of the limitations of this study was that we interviewed only registered PHPs and did not account for the informal care sector. Further studies, including the informal sector also, can give more helpful information on the complete picture of TB care in rural/tribal areas.

## 5. CONCLUSION

This study shows that the active engagement of private providers (PPs), especially AYUSH practitioners in rural areas is needed for improvement in the TB detection and care. The involvement of PHPs, especially AYUSH practitioners, in TB detection is pivotal for eliminating TB. The huge potential of the country's rural private healthcare sector in contributing effectively to the TB elimination goals needs to be tapped. By leveraging the extensive presence of PHPs, TB screening and detection can be extended to underserved populations, ensuring a more comprehensive coverage. It is imperative to ensure that the programme guidelines are implemented in real-world settings and adapted to suit local needs.

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